

TABLE 1.—Percentage of thunderstorm frequency for the 10-year period 1904-1913—Continued.

Stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Storms in 10 years.
Nantucket, Mass.	2	3	5	9	13	15	21	14	9	5	5	0	233
Narragansett Pier, R. I.	2	3	3	2	12	16	23	19	9	2	2	0	169
Nashville, Tenn.	1	3	7	11	12	18	19	15	9	2	3	1	566
New Haven, Conn.	1	2	5	5	14	19	25	18	10	3	1	0	261
New Orleans, La.	3	4	4	3	10	15	20	18	14	2	1	3	744
New York, N. Y.	1	1	1	9	14	18	25	13	9	2	0	0	284
Norfolk, Va.	0	0	2	2	15	21	22	19	7	3	3	0	406
Northfield, Vt.	0	0	2	3	14	18	31	21	10	3	0	0	242
North Platte, Nebr.	0	0	2	3	16	23	25	20	8	2	0	0	448
Oklahoma, Okla.	0	3	5	12	17	19	14	13	10	5	2	0	448
Omaha, Nebr.	0	1	3	8	16	20	18	17	12	6	2	0	499
Oswego, N. Y.	1	2	4	4	14	19	22	18	11	0	1	0	296
Palestine, Tex.	2	4	7	14	14	14	15	11	10	5	2	3	523
Pensacola, Fla.	2	4	5	6	9	14	20	19	14	3	1	2	814
Philadelphia, Pa.	0	3	5	7	15	18	23	19	7	4	1	0	319
Phoenix, Ariz.	0	2	3	3	4	4	29	36	11	3	3	1	332
Pierre, S. Dak.	0	0	0	4	14	23	26	22	8	3	0	0	350
Pittsburgh, Pa.	2	1	6	8	13	20	22	16	11	3	0	0	431
Port Crescent, Wash.	0	0	0	0	8	21	25	21	4	0	4	17	24
Port Huron, Mich.	1	2	3	8	14	18	19	19	9	5	2	0	325
Portland, Me.	1	0	0	3	12	19	29	18	11	4	0	0	153
Portland, Oreg.	2	6	4	7	24	9	17	15	7	6	4	0	54
Pueblo, Colo.	0	0	1	5	14	20	29	22	9	1	0	0	484
Raleigh, N. C.	1	1	4	6	13	19	25	19	9	2	1	0	469
Rapid City, S. Dak.	0	0	1	3	13	26	28	22	6	2	0	0	359
Red Bluff, Cal.	8	4	10	8	25	17	8	2	8	10	0	2	52
Richmond, Va.	0	0	4	9	13	20	23	21	8	2	1	0	415
Roseburg, Oreg.	0	0	9	6	14	17	20	11	17	3	0	3	35
Sacramento, Cal.	6	9	26	0	6	9	0	6	21	12	0	3	34
St. Louis, Mo.	1	2	7	10	13	17	16	17	11	4	3	0	526
St. Paul, Minn.	0	0	1	4	15	22	19	21	14	3	0	0	328
Salt Lake City, Utah.	3	1	5	7	8	16	20	25	12	4	0	0	356
San Antonio, Tex.	0	2	6	13	16	10	13	13	15	5	3	3	386
San Diego, Cal.	6	3	11	3	6	6	11	17	9	14	6	9	35
San Juan, P. R.	0	0	1	3	9	13	14	16	20	16	6	2	472
Sandusky, Ohio.	2	1	4	6	15	18	21	17	10	4	1	0	400
San Francisco, Cal.	12	50	12	0	0	0	0	0	13	0	13	8	8
Santa Fe, N. Mex.	0	1	3	4	9	15	29	24	12	3	0	0	732
Sault Ste. Marie, Mich.	0	0	4	4	9	17	19	19	15	11	3	0	209
Savannah, Ga.	1	3	3	6	11	17	25	20	11	2	0	1	606
Seattle, Wash.	0	3	10	3	10	25	15	14	12	3	2	2	59
Sioux City, Iowa.	0	0	1	6	15	21	21	21	11	4	2	0	436
Spokane, Wash.	0	0	0	8	14	25	24	18	10	3	0	0	108
Springfield, Ill.	2	1	8	11	16	17	17	13	9	4	3	0	509
Springfield, Mo.	2	2	5	10	14	19	18	12	10	4	3	1	572
Tampa, Fla.	1	2	3	3	10	17	24	22	14	3	0	1	944
Tatoosh Island, Wash.	8	6	2	2	2	4	9	6	19	12	14	11	53
Toledo, Ohio.	2	1	3	8	13	18	23	16	9	4	2	0	466
Topeka, Kans.	1	1	5	7	15	17	18	15	12	6	4	0	512
Vicksburg, Miss.	3	5	6	11	11	16	17	15	10	2	2	2	668
Walla Walla, Wash.	0	0	4	16	28	21	20	11	1	0	0	0	88
Washington, D. C.	1	2	4	8	12	18	25	17	9	2	1	0	392
Wichita, Kans.	0	2	4	9	17	18	18	14	12	5	2	0	531
Williston, N. Dak.	0	0	0	2	11	29	23	25	9	1	0	0	211
Wilmington, N. C.	1	3	5	6	11	18	23	21	9	3	1	0	511
Winnemucca, Nev.	0	0	4	4	12	23	23	21	11	3	1	0	142

STORMS AND HURRICANES IN JAMAICA, 1655-1915.

By MAXWELL HALL.

[Dated: Montego Bay P. O., Jamaica, W. I., Dec. 12, 1915.]

The Government Meteorologist for Jamaica, publishes in his Weather Report No. 449, for November, 1915, a corrected list of severe storms and hurricanes that have passed over Jamaica and done more or less damage there between the years 1655 and 1915. In correcting his list he has omitted those which, though represented on some charts as crossing Jamaica, were not felt as severe storms on the island or really missed it completely. The lower limit of wind velocity adopted for qualifying in this list is one of 60 miles an hour, and the storm of June 13, 1904, barely secured a place in the table on this basis; it had unusual interest because of two cyclones visiting the west end of the island. The corrected table is printed below.—C. A., jr.

Table of storms and hurricanes in Jamaica, 1655 to 1915.

Year.	Month.	Description.	Authority; notes.
1670	Oct. 7.	Storm; the fleet at Jamaica driven ashore.	[Poey: K. Johnstone Phys. Atl., 1856.
1689		Storm mentioned in early vols. Jamaica Almanac.	Gardner calls it a hurricane, ed. 1909, p. 73.
1712	Aug. 28.	First hurricane experienced by English in Jamaica.	[Poey: Gardner, p. 112.
1714	Aug. 29.	Some men-of-war driven ashore in a storm.	[Poey: K. Johnstone Phys. Atl.
1722	Aug. 28.	Great hurricane damaged the whole island: center passed over Port Royal.	Atkins "Voyage to Guinea, Brazil, and the W. I.," 1737, p. 238; Long, v. 2, p. 145.
1726	Oct. 22.	Hurricane swept east end of island.	Long, v. 2, p. 146; Gardner p. 115.
1744	Oct. 20.	Great hurricane damaged whole island; 104 ships wrecked in harbor.	Clowes, 3, p. 275; Long, v. 2, p. 146; Gardner, p. 125.
1751	Sept. 2.	Storm.	Jamaica Almanac.
1780	Oct. 3.	Great hurricane destroyed Savannah-la-Mar and damaged whole island.	Wm. Beckford "Descriptive account of the island of Jamaica," 1790. Bryan Edwards, ed. 1819, v. 1, p. 236. Reid, "Law of storms," etc.
1781	Aug. 1.	Hurricane; 120 vessels wrecked in Kingston Harbor and at Port Royal.	Bryan Edwards, v. 1, p. 234, brief mention.
1784	July 30.	Hurricane; wrecked all but 4 of vessels at Kingston and Port Royal.	Do.
1785	Aug. 27.	Storm.	Do.
1786	Oct. 20.	Storm followed by great scarcity of food.	Do.
1812	Oct. 12-14.	Great hurricane damaged the whole island.	Jamaica mag.; Jam. phys. jour., 1835.
1813	Aug. 1.	Storm damaged shipping and buildings in Kingston.	Jam. Courant, Aug. 2-9, 1813; Bryan Edwards, v. 5, p. 77.
1813	Aug. 28.	Storm at Savannah-la-Mar wrecked vessels.	
1815	Oct. 18, 19.	Hurricane over eastern part of island, and great floods.	Jam. phys. jour., 1835; Bryan Edwards, v. 5, p. 78.
		Great destruction of houses in St. George, St. David, etc.	Jam. wthr. rpt., No. 352, Apr., 1908.
1818	Nov. 18, 20.	Hurricane swept western part of island.	
1832	Aug. 7.	Violent storm that lasted but 3½ hours.	Keith Johnstone, Phys. Atlas.
1837	Sept. 26, 27.	Storm, probably felt all over the island.	Jamaica Despatch; Reid: "Law of storms."
1844	Oct. 5.	Storm over the western end of the island, Falmouth, Montego Bay, and Black River.	
1874	Oct. 31.	Hurricane over the eastern half of the island.	
	Nov. 2.	Center passed over St. Ann's Bay.	
1880	Aug. 18.	Great hurricane; two cyclones damaged the eastern half of the island.	Jam. wthr. rep., v. 1, Introduction.
1886	June 27.	Storm, whose center passed rapidly from the east end to Montego Bay.	Jam. wthr. rep., No. 67.
1886	Aug. 19, 20.	Hurricane, whose center took nearly the same course.	Jam. wthr. rep., No. 69.
1903	Aug. 11.	Great hurricane, whose center took nearly the same course.	U. S. Mo. wthr. rev., Sept., 1905; Jam. wthr. rep., v. 4, Introduction.
1904	June 13.	Storm and heavy rains over west end of island. Montego Bay bridge destroyed.	U. S. Mo. wthr. rev., Aug., 1904; Jam. wthr. rep., v. 4, Introduction.
1912	Nov. 18.	Great hurricane; two cyclones devastated the west end of the island.	Jam. wthr. rep., No. 411.
1915	Aug. 12, 13.	Hurricane destroyed banana fields throughout the island, and damaged all the towns on the northern coast.	Jam. wthr. rep., No. 445.
1915	Sept. 25, 26.	Storm.	Jam. wthr. rep., No. 447.

Dates of great hurricanes are in bold-face type.

THE APPLICATION OF PHYSICAL PRINCIPLES TO PROBLEMS SUGGESTED BY OCEANIC CIRCULATION AND TEMPERATURES.¹

By GEORGE F. McEWEEN.

[Dated: La Jolla, Cal.]

Most of our quantitative knowledge of the great ocean currents depends upon the difference between the true position of a ship and that determined from "dead-reckoning"; and upon observations of floating objects. This work has been supplemented by current meter observations in a few limited regions. Also the distri-

¹ Abstract of a paper presented at the San Francisco joint meeting of the Physical Society and Section B of the A. A. A. S., Aug. 2-7, 1915. Reprinted from Phys. Rev., December, 1915 (2), 6: 500-1.